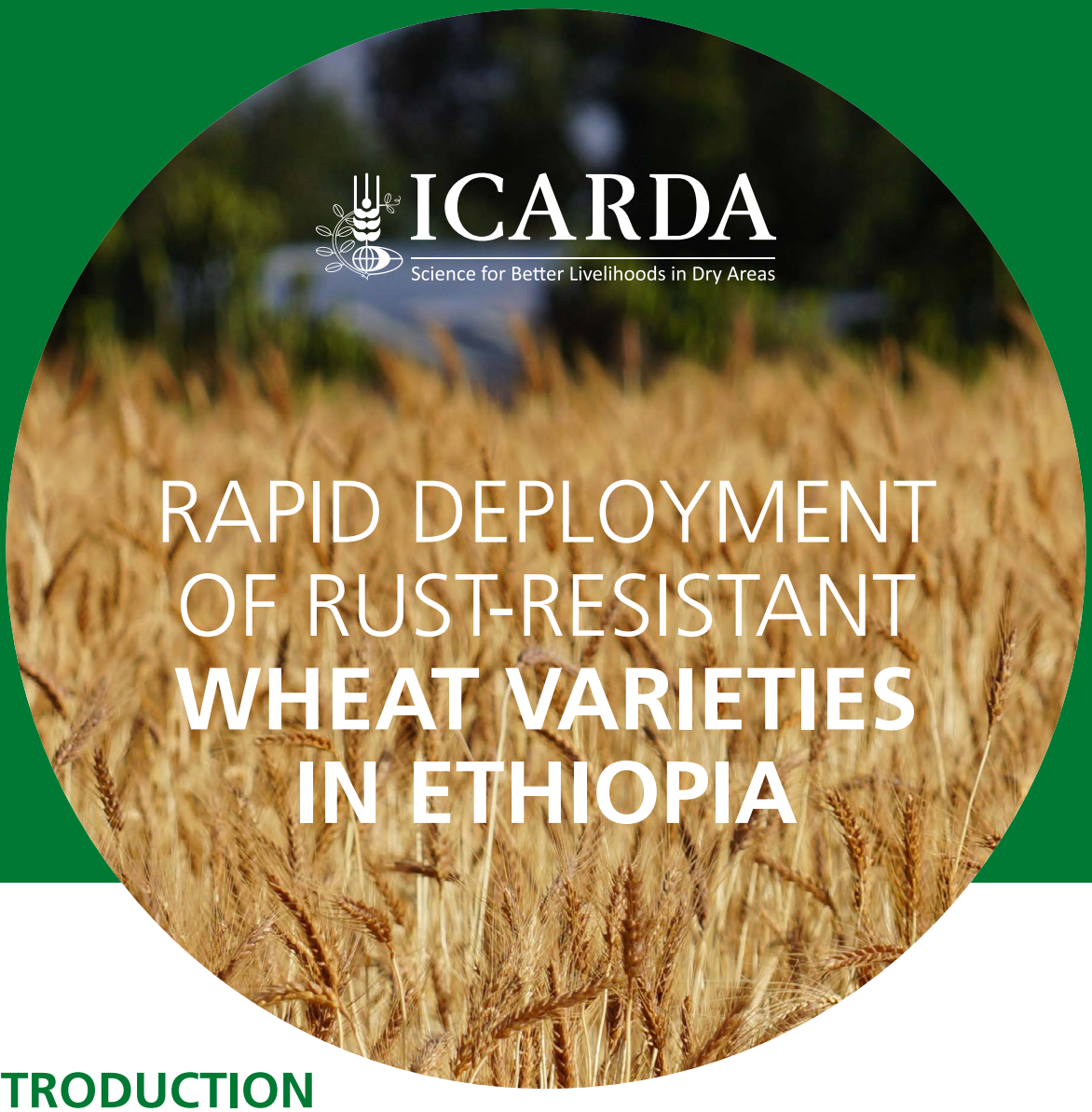

ICARDA
Science for Better Livelihoods in Dry Areas

RAPID DEPLOYMENT OF RUST-RESISTANT **WHEAT VARIETIES IN ETHIOPIA**

1.INTRODUCTION

Ethiopia is one of the major wheat producing countries in Africa with an estimated area of 1.7 million ha and production of 4,23,1589 at the productivity level of 2.5 ton/ha. About 4.6 million small-scale farmers are involved in wheat production. A yellow rust epidemic in 2010 devastated close to 600,000 ha exacerbating the already looming stem rust threat in the country. In response to this, in 2011, an ICARDA-EIAR (Ethiopian Institute of Agricultural Research) joint project (2011-2014) supported by USAID was launched to deploy resistant varieties to counter the threat of rusts.

2. METHODOLOGY AND APPROACH

The project, built on the experiences of a regional USAID Famine Fund project implemented by ICARDA for tackling stem rust (Ug99). It aimed at the rapid deployment of high-yielding stem and yellow rust-resistant wheat varieties and focused on:

- Strengthening the national wheat breeding program's capacity to develop rust-resistant varieties and fast-track their testing and release;
- Popularization and demonstration of rust-resistant varieties and associated technologies;
- Accelerated seed multiplication (pre-release, post-release and certified seed production) during the main and off-seasons by public or private sector;
- On-farm seed production directly working with farmers in target districts of Agricultural Growth Program; and
- Strengthening the infrastructure and human resources capacity of stakeholders along the value chain.

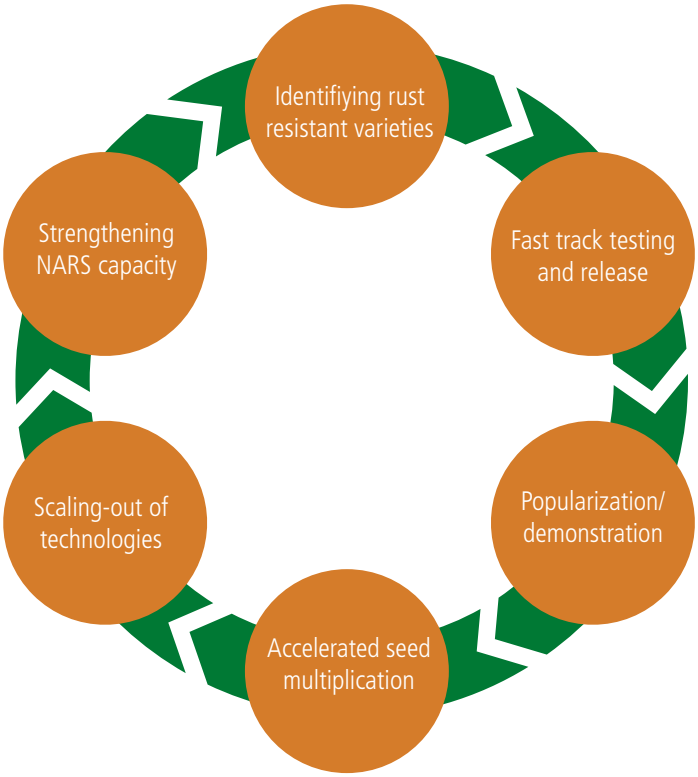

Figure 1. Approach for fast tracking variety release and accelerated seed multiplication

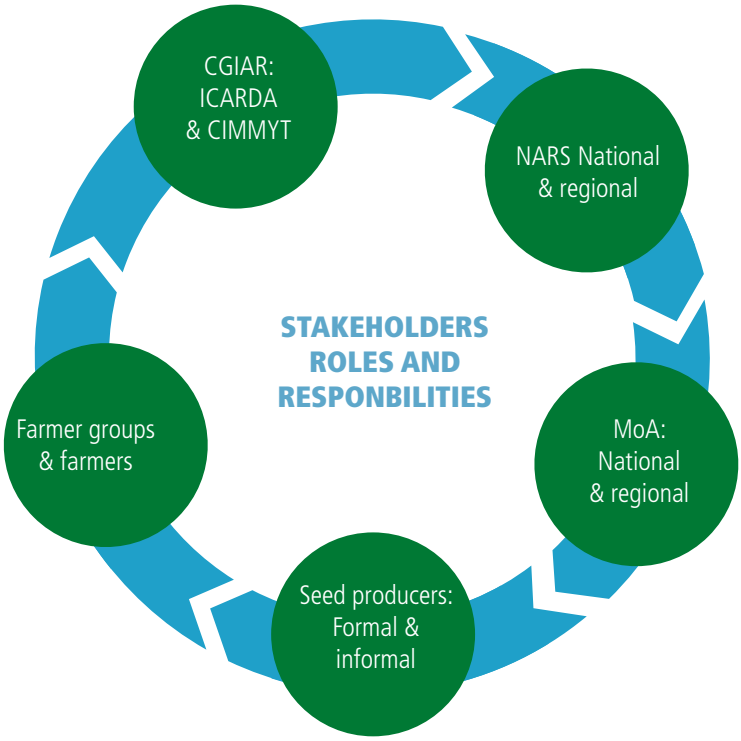

Figure 2. Partners and stakeholders in wheat seed projects

3. ACHIEVEMENTS

The project has established a functional platform of broad range of partners and stakeholders which include:

- Federal and regional agricultural research institutes;
- Federal and regional public seed enterprises and private seed companies;
- Public and private state farms;
- Federal, regional, zonal and district Bureau of Agriculture and input directorates of Ministry of Agriculture (MoA);
- Farmer seed producers associations and Farmers' Cooperative Unions; and
- Farmers/seed users.

3.1 Wheat varietal release

The project provided substantial support to the National Wheat Research Program, at Kulumsa Agricultural Research Center (KARC) in fast-track testing and releasing of new rust-resistant varieties.

- A total of 22 bread and durum wheat varieties were released from 2010 to 2015 associated with USAID and African Development Bank projects and implemented by national partners.

3.2 Early generation seed production

Early generation seed (breeder, pre-basic basic seed) was produced during the main and off-season. The public and private seed companies and farmer seed producers were supplied with basic seed from 2011/12 to 2014/15 crop season.

- About 7,013 tons basic seed of rust-resistant wheat varieties were produced and provided to seed producers and suppliers.

3.3 Large-scale certified seed production

A significant amount of certified seed of rust-resistant wheat varieties was produced and distributed to farmers through partnerships of the public and private sector.

- About 5,622 tons (15% new varieties in 2012/13 crop season), 31,074 tons (73% new varieties in 2013/14 crop season) and 66,775 tons (86% new varieties in 2014/15 crop season) certified seed of rust-resistant wheat varieties were distributed to farmers.

- This was sufficient to plant an estimated bread wheat area of 37,480 ha (in 2012/13 crop season), 207,160 ha (in 2013/14 crop season), and 445,166 ha (in 2014/15 crop season) for a quick deployment of new rust-resistant wheat varieties.

3.4 On-farm informal seed production and diffusion

Along with direct support to formal sector operations of NARS and partnership with public and private seed enterprises, the project aimed to bring the basic seed of rust-resistant wheat varieties directly to target districts in the 45 districts of Agricultural Growth Program working with farmers and district Bureau of Agriculture, using a variety of approaches including revolving seed scheme, pre-scaling up activities, and development of value chain. For target districts, varieties distributed and seed produced with farmers, see the adjacent map.

Table 1. On-farm seed production with farmer groups for informal distribution

Items	On-farm seed production	Pre-scaling	Value chain	Emergency seed	Total
Seed distributed (t)	919	115	72	120	1226
Area planted (ha)	7164	795	577	813	9349
Estimated production (t)	24785	2626	2139	2317	31867
Total farmers reached	21722	3110	920	3799	29551
% of female farmers	7	8	9	2	7
Beneficiary households (HHs)	130,332	18,660	5,520	22,794	177,306

3.5 Strengthening infrastructure and capacity

Substantial investment was made to strengthen the facilities and infrastructure and human resources capacity of NARS and key stakeholders during the project period.

Infrastructure

- Two heavy duty tractors with levellers, planters and ridgers, each with spare parts, were purchased and distributed to key NARS.
- A seed storage facility at KARC, and a seed quality laboratory (KARC and DZARC - Debre Zeit Agricultural Research Center) was supported and 14 sewing machines and 150,000 polybags were purchased and used for branding EIAR basic seed production.
- A total of one station wagon, five pick-ups, one minivan and two automobiles were provided to NARS.
- Three mobile seed cleaners, one each for farmer seed producers cooperatives in Oromia Amhara and Tigray regions, were provided.

Human resources

The project created awareness of wheat rusts both at the managerial and technical levels. Policy makers and senior managers participated in international and national workshops and the technical staff attended regional and in-country courses.

- A total of 198 participants attended workshops and conferences on wheat rust and durum wheat value chain
- Regional and in-country courses were organized for key stakeholders in quality seed production: Nine participants attended ICARDA regional courses; and 1734 participants attended the in-country courses (244 technical staff and 1490 farmers (of which 222 were women).

Table 2. Number of participants who attended in-country courses

Target groups	Number of personnel trained				Total
	2011/12	2012/13	2013/14	2014/15	
SMS & DAs*	270 (35)	410 (45)	370 (75)	440 (67)	1490 (222)
Farm Managers	50	45	35	40	157
Others		24	36	27	87
Total	320	479	441	507	1734

*Note: SMS= subject matter specialists; DAs=Development agents; *Numbers in parenthesis are female participants*

6. PROJECT IMPACT ON ADOPTION AND FOOD SECURITY

The contribution of the collaborative project was assessed in terms of (i) enhancing the adoption of rust-resistant bread wheat varieties, (ii) the impact on the productivity and food security among smallholder farmers, and (iii) the impact on institutional innovations to respond to rust epidemics.

- Among the three rust-resistant varieties, Kakaba appears to be the most important, grown by 49% of households, followed by Digelu and Danda'a, grown by 14% and 5% of the sample households, respectively
- In terms of area, about 67% of the wheat area is under rust-resistant varieties.
- The households adopting rust-resistant varieties obtain 351 to 455 kg/ha more wheat yield than non-adopters
- Institutional innovations have led to fast-track testing and release, accelerated seed multiplication and rust epidemic early warning system

4. PROJECT COMMUNICATION

The project leaders from NARS attended and presented the achievements to the annual FARA meeting (2013, Ghana), international yellow rust conference (2014, Turkey), the 13th Iranian Crop Science Congress and 3rd Iranian Seed Science and Technology Conference (2014, Iran). A short video describing the activities undertaken and farm level impacts on the livelihoods of farmers was produced and circulated to all stakeholders in Ethiopia, USAID and the CGIAR community.

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